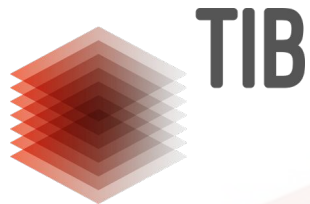


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Importing RDF ontologies to SMW with *ontology2smw* and the *Academic Event Ontology*

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SMWCon Fall 2020

ontology2smw

A Python command line tool

automating the import of an RDF ontology (AEON) into a Semantic Mediawiki instance

- make Semantic Mediawiki pages into true Linked Open Data entities
- prevent manual labour and its errors in the creation of semantic terms
- easy maintenance: integrate changes from ontology to wiki schema quickly

Context & Origin

ConfIDent - a service for open research information on academic events

- TIB Hannover & RWTH Aachen, funded by the DFG
- quality-driven, collaborative curation of semantically structured metadata
 - based on [OpenResearch.org](https://openresearch.org)
- FAIR metadata (findable, accessible, interoperable and reusable)
- reliable and transparent for all stakeholders (researchers, organizers, librarians ...)
- data exchange by connecting to existing services (e.g. VIVO, PID-Graph, WikiData)
- DOI registration for academic events and event series via DataCite

AEON Ontology

Other existing ontologies - Pros & Cons

There are other ontologies, but they don't fit our needs enough:

- [SEO - The Scientific Event Ontology](#) - not actively maintained & some logical inconsistencies
 - reuses:
 - [Semantic Web for Research Communities Ontology](#)
 - the [conference-ontology](#) from scholarlydata.org
- [schema.org/event](#) & [schema.org/eventseries](#) - heavily used in but not fine grained enough
- [GND Ontology](#) - not very elaborate for events
- [BIBO](#) - has some classes for conferences and alike events
- [FRAPO](#) - has classes like conference fee etc.
- [FaBiO](#) - has classes for publications as conference output

AEON Ontology

Academic Event

- scholars & researchers meet to present, hear and discuss the latest work in their field
 - e.g. conferences, workshops, hackathons, talks, meet-ups, seminars, ...

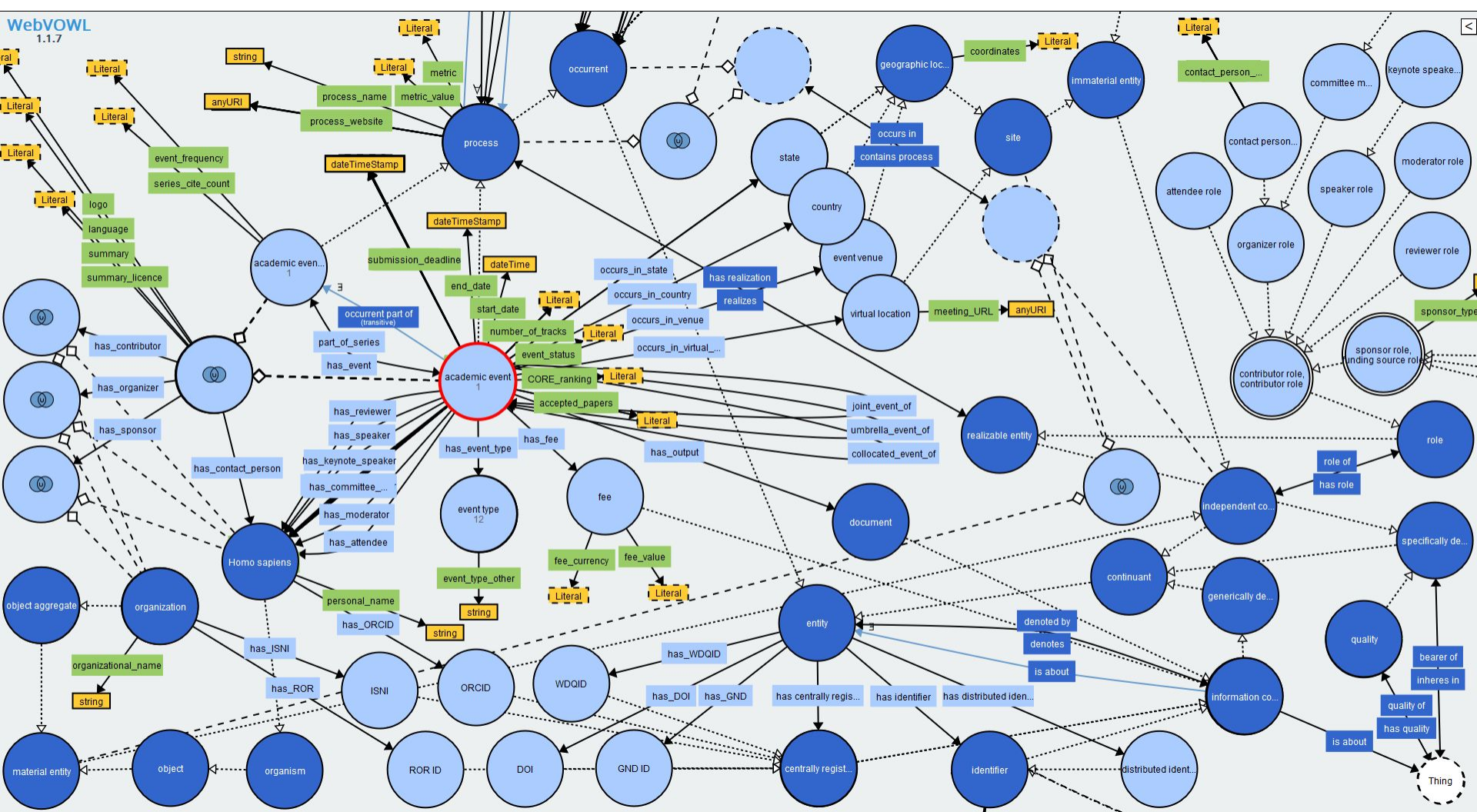
The Academic Event Ontology (AEON)

- a BFO-based ontology representing information regarding academic events
 - supports identification, development, management, evaluation and impact assessment
 - components of events and event series, as well as identification and reuse of works presented or developed at events
- independent of knowledge, creative domain, or topics of events
- focused on events → need for other ontologies for associated entities

AEON Ontology

- inference due to BFO alignment
 - Protégé - Pallet reasoner
 - better interoperability
 - possible unknown insights

Property assertions: PIDapalooza2020	
Object property assertions +	
occurs_in_city	Lisbon
part_of_series	PIDapalooza
has_sponsor	_organization_1
'has identifier'	_ConfIDentiD_1
realizes	_gold_sponsor_1
occurs_in_country	Portugal
has_WDQID	Q65929359
realizes	_PIDapalooza_Speaker_1
has_event_type	Conference
has_speaker	_Person_1
'has participant at some time'	_Person_1
'has participant at some time'	_organization_1
'occurs in'	Portugal
'occurs in'	Lisbon
'occurent part of'	PIDapalooza
'proper occurent part of'	PIDapalooza
'denoted by'	Q65929359
'denoted by'	_ConfIDentiD_1
'has centrally registered identifier'	Q65929359
has_contributor	_Person_1
has_contributor	_organization_1



SMW - semantic knowledge management system



- essential semantic terms types available:
 - Categories (Classes)
 - Properties
- RDF export
- semantic queries
- integrate into Mediawiki ecosystems of extensions
- minimal technical overhead
- highly customizable
- user friendly

Interoperability: **SMW and other Linked Open Data systems?**

Approach: shared set of terms & relations: ontology

- Combining content with other data sources, which use the same ontology

Imported Ontologies in SMW

MediaWiki:Smw_import_prefix

Smw import foaf


From /oooooooooooo.io/

<http://xmlns.com/foaf/0.1/%7CFriend Of A Friend>

```

Organization|Category
Person|Category
Project|Category
name|Type:Text
homepage|Type:URL
mbox|Type:Email
mbox_sha1sum|Type:Text
depiction|Type:URL
phone|Type:Text
knows|Type:Page
member|Type:Page

```


FINA Wiki ▾ Resources ▾ Content ▾

MediaWiki:Smw import dc

<http://purl.org/dc/elements/1.1/%7CDublin Core Metadata Element Set, Version 1.1>


```

contributor|Type:Page
coverage|Type:Page
creator|Type:Page
date|Type:Date
description|Type:Text
format|Type:Text
identifier|Type:Annotation URI
language|Type:Text
publisher|Type:Page
relation|Type:URL
rights|Type:Text
source|Type:Page
subject|Type:Keyword
title|Type:Text
type|Type:Text
point|Type:Geographic coordinates

```

Imported Ontologies in SMW

Term (Property & Category) definitions

 FINA Wiki ▾ Resources ▾ Content ▾

Property:Language

- *Imported from* dc:language (dc | Dublin Core Metadata Element Set, Version 1.1)
- *Has preferred property label*
 - Language (en)
 - Langue (fr)
 - Sprache (de)
- *Has property description*
 - Language of the correspondence (en)
 - Sprache der Korrespondenz (de)

Imported Ontologies in SMW

RDF export will use ontology terms

```
<rdfs:label>Abbati degli Olivieri 1742</rdfs:label>
<rdfs:isDefinedBy rdf:resource="https://fina.oeaw.ac.at/wiki/index.php/Special:ExportRDF/
Abbati_degli_Olivieri_1742"/>
<swvt:page rdf:resource="https://fina.oeaw.ac.at/wiki/index.php/Abbati_degli_Olivieri_1742
"/>
<swvt:wikiNamespace rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">0</swvt:
wikiNamespace>
<swvt:wikiPageContentLanguage rdf:datatype="http://www.w3.org/2001/XMLSchema#string">en</
swvt:wikiPageContentLanguage>
<foaf:name rdf:resource="&wiki;Annibale degli Abbati Olivieri"/>
<dc:description rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Abbati di Olivieri,
Annibale (1742), "Dissertazione di Annibale degli Abati Olivieri sopra due medaglie
Sannitiche", "Saggi di dissertazioni accademiche pubblicamente lette nella nobile accademia
etrusca dell'antichissima città di Cortona, II, Rome, p. 49-72.</dc:description>
<dc:point rdf:datatype="http://www.w3.org/2001/XMLSchema#string">41.89332,12.48293</dc:
point>
<property:ID rdf:datatype="http://www.w3.org/2001/XMLSchema#string">4584</property:ID>
<dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Italian</dc:language>
<foaf:homepage rdf:resource="https://books.google.be/books?id=mMwpAAAAYAAJ&amp;pg=PA49&amp;
dq=olivieri+sopra+due+medaglie+sannitiche&amp;hl=fr&amp;sa=X&amp;
ved=0ahUKEwi9_IqRovTKAhVEahQKHfU6AtgQ6AEIRzAF#v=onepage&amp;
q=olivieri sopra due medaglie sannitiche&amp;f=false"/>
```

Imported Ontologies in SMW

Manually importing dozens/hundreds of terms?

aeon:AEON_0000001 aeon:AEON_0000002 aeon:AEON_0000003 aeon:AEON_0000004 aeon:AEON_0000005
 aeon:AEON_0000006 aeon:AEON_0000007 aeon:AEON_0000008 aeon:AEON_0000009 aeon:AEON_0000010
 aeon:AEON_0000011 aeon:AEON_0000012 aeon:AEON_0000013 aeon:AEON_0000014 aeon:AEON_0000015
 aeon:AEON_0000016 aeon:AEON_0000017 aeon:AEON_0000018 aeon:AEON_0000019 aeon:AEON_0000020
 aeon:AEON_0000021 aeon:AEON_0000022 aeon:AEON_0000023 aeon:AEON_0000024 aeon:AEON_0000025
 aeon:AEON_0000026 aeon:ExternalIdentifier aeon:Fee aeon:Identifier aeon:Location aeon:PhysicalLocation
 aeon:SMW_datatype aeon:SMW_import_info aeon:Subject aeon:Topic aeon:VirtualLocation aeon:WikidataLabel
 aeon:WikidataURI aeon:collocated_event_of aeon:committee aeon:has_DOI aeon:has_GND aeon:has_ISNI aeon:has_ORCID
 aeon:has_ROR aeon:has_WDQID aeon:has_attendee aeon:has_committee_chair aeon:has_committee_member
 aeon:has_contact_person aeon:has_contributor aeon:has_event aeon:has_event_type aeon:has_external_identifier aeon:has_fee
 aeon:has_fee aeon:has_finance_committee_chair aeon:has_finance_committee_member aeon:has_general_committee_chair
 aeon:has_general_committee_member aeon:has_identifier aeon:has_internal_identifier aeon:has_keynote_speaker
 aeon:has_local_committee_chair aeon:has_local_committee_member aeon:has_moderator aeon:has_organizer aeon:has_output
 aeon:has_part aeon:has_program_committee_chair aeon:has_program_committee_member
 aeon:has_publication_committee_chair ...

Automated Ontology import to SMW

SMW terms' definition, described in ontology RDF

- `aeon:SMW_datatype`
- `aeon:SMW_import_info`

```
### https://github.com/tibonto/aeon#collocated\_event\_of
aeon:collocated_event_of rdf:type owl:ObjectProperty ;
                           rdfs:subPropertyOf aeon:part_of ;
                           rdfs:domain aeon:AEON_00000001 ;
                           rdfs:range aeon:AEON_00000001 ;
                           aeon:SMW_datatype "Page" ;
                           aeon:SMW_import_info "[[Category:AEON]] [[Category:Imported vocabulary]]" .

### https://github.com/tibonto/aeon#has\_DOI
aeon:has_DOI rdf:type owl:ObjectProperty ;
              rdfs:subPropertyOf aeon:has_external_identifier ;
              rdfs:range aeon:AEON_00000016 ;
              aeon:SMW_datatype "External identifier" ;
              aeon:SMW_import_info "" "External formatter uri [[External formatter uri::https://doi.org/$1]]
[[Category:AEON]] [[Category:Imported vocabulary]]"" .
```

Automated Ontology import to SMW

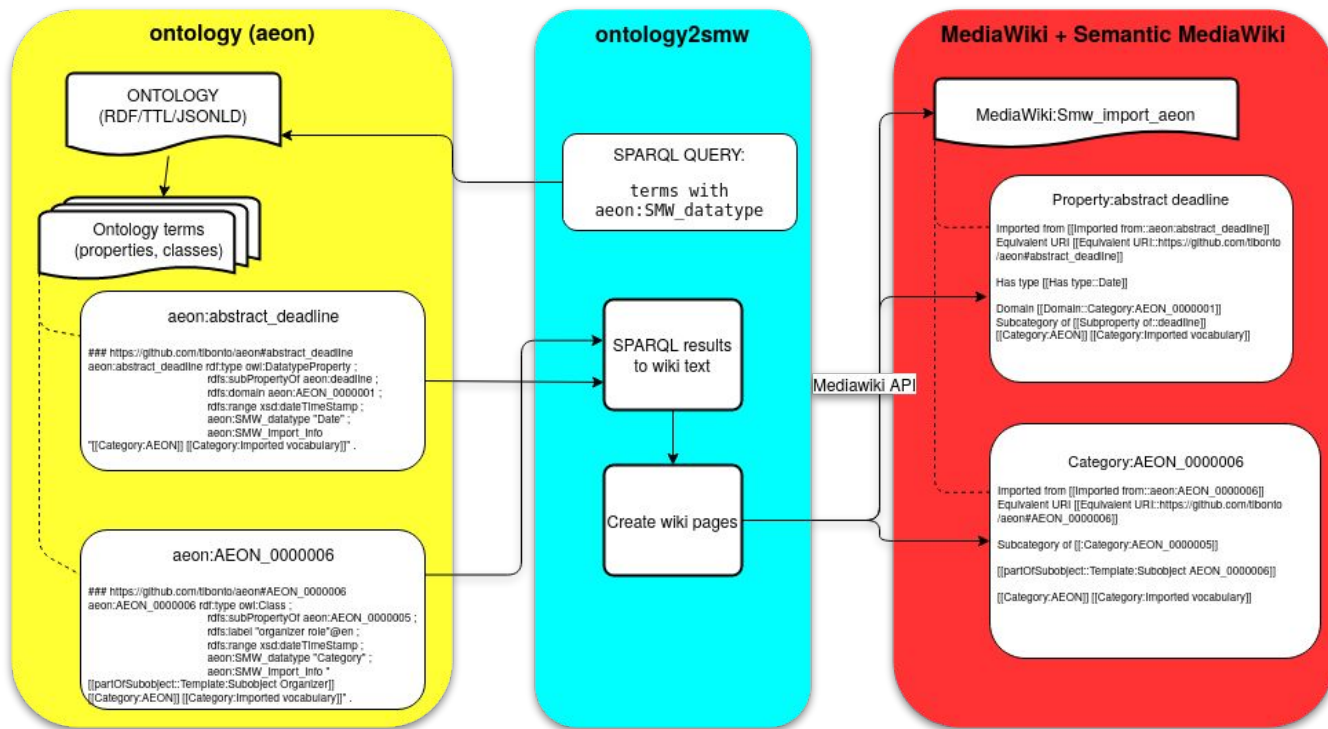
ontology2smw python cli application

`ontology2smw --format ttl --ontology aeon/aeon.ttl --write`

Main Python Libraries:

- RDFlib
- mwclient
- Jinja2

A local VM for testing



SMW RDF/triple-store use ontology terms

Data interoperable with sources that use the same ontology, or are aligned to it

openGLAM.at Hackathon 2020

Event:openGLAM.at Hackathon 2020	
has_event_type:	hackthon
duration:	2020-04-27 00:00:00+00:00 - 2020-04-30 00:00:00+00:00
Occurs in	
occurs_in_country:	Austria

```
<swivt:wikiPageSortKey rdf:datatype="http://www.w3.org/2001/XMLSchema#string">openGLAM.at Hackathon 2020</swivt:wikiPageSortKey>
<aeon:end_date rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2020-04-30T00:00:00Z</aeon:end_date>
<aeon:end_date rdf:datatype="http://www.w3.org/2001/XMLSchema#double">2458969.5</aeon:end_date>
<aeon:has_WDQID rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Q68325979</aeon:has_WDQID>
<skos:exactMatch rdf:resource="https://www.wikidata.org/wiki/Q68325979"/>
<aeon:has_event_type rdf:datatype="http://www.w3.org/2001/XMLSchema#string">hackthon</aeon:has_event_type>
<aeon:has_organizer rdf:resource="&wiki;openGLAM.at"/>
<aeon:occurs_in_country rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Austria</aeon:occurs_in_country>
<aeon:process_name rdf:datatype="http://www.w3.org/2001/XMLSchema#string">openGLAM.at Hackathon 2020</aeon:process_name>
<aeon:start_date rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2020-04-27T00:00:00Z</aeon:start_date>
<aeon:start_date rdf:datatype="http://www.w3.org/2001/XMLSchema#double">2458966.5</aeon:start_date>
```

openGLAM.at Hackathon 2020

openGLAM.at

Q68325979

SMW RDF/triple-store use ontology terms

```

5 PREFIX owl: <http://www.w3.org/2002/07/owl#>
6 PREFIX aeon: <https://github.com/tibonto/aeon#>
7 PREFIX confident: <https://www.confident-conference.org/r/wiki/>
8
9 SELECT ?prop ?value
10 WHERE {
11   confident:openGLAM.at_Hackathon_2020 ?prop ?value .
12   FILTER (CONTAINS(STR(?prop), 'aeon' ))
13 }

```

QUERY RESULTS



Table

Raw Response



Showing 1 to 9 of 9 entries

Search:

Show

100


entries


	prop	value
1	aeon:start_date	"2020-04-27T00:00:00Z"^^xsd:dateTime
2	aeon:start_date	"2458966.5e0"^^xsd:double
3	aeon:process_name	"openGLAM.at Hackathon 2020"
4	aeon:end_date	"2020-04-30T00:00:00Z"^^xsd:dateTime
5	aeon:end_date	"2458969.5e0"^^xsd:double
6	aeon:occurs_in_country	"Austria"
7	aeon:has_WDQID	"Q68325979"
8	aeon:has_organizer	confident:openGLAM.at

Can I use ontology2smw with ontologies without aeon:SMW_datatype & aeon:SMW_import_info?

Yes!! But not yet. Development is underway in brach:[issue31_ontologies_wout_aeon](#)

importing ontologies without aeon:SMW_datatype #31

 **andrecastro0o** opened this issue 10 days ago · 4 comments



andrecastro0o commented 10 days ago · edited ▾ Member 😊 ⋮

Currently ontology2smw import to wiki only the terms which contain a value to the property `aeon:SMW_datatype` as visible in SPARQL [query_classes_properties.rq](#)

I would like to make ontology2smw able to import other ontologies terms, even if they do not have `aeon:SMW_datatype` , as for instance [datacite datacite ttl](#) OR GND Ontology ([gndo](#)) [gndo ttl](#)

Development Steps

- ☒ SPARQL query: to extract information from ontology terms
- ☐ Test ontology query
- ☒ Mapping xsd datatypes to SMW datatypes
- ☒ All namespaces & prefix dict, derived from <http://prefix.cc/>
- ☐ Prompt user for prefix when not found in all prefixes dict
- ☐ Implement

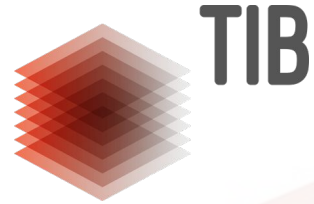
Can I use ontology2smw with ontologies without aeon:SMW_datatype & aeon:SMW_import_info?

Method: SPARQL query

- Capture: Class and Properties
- Capture: term's definition values necessary to define it in SMW:
 - rdf:type
 - rdfs:range
 - rdfs:subClassOf
 - rdfs:subPropertyOf
 - rdfs:label

```
SELECT DISTINCT ?term ?termType ?label ?range ?subclassof ?subpropertyof
WHERE {
  {
    ?term rdf:type owl:Class.
    BIND (owl:Class as ?termType).
    OPTIONAL {
      ?term rdfs:subClassOf ?subclassof.
      FILTER (!isBlank(?subclassof))
    }
  }
  UNION
  {
    ?term rdf:type owl:DatatypeProperty.
    BIND (owl:DatatypeProperty as ?termType).
    OPTIONAL {
      ?term rdfs:subPropertyOf ?subpropertyof.
      FILTER (!isBlank(?subpropertyof))
    }
    OPTIONAL{ ?term rdfs:range ?range. }
  }
  UNION
  {
    ?term rdf:type owl:ObjectProperty.
    BIND (owl:ObjectProperty as ?termType).
    OPTIONAL {
      ?term rdfs:subPropertyOf ?subpropertyof.
      FILTER (!isBlank(?subpropertyof))
    }
  }
}
```

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github.com/TIBHannover/ontology2smw
github.com/tibonto/aeon

Contact

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